

Patent Application
ATM-515 (7486)

REMARKS

Response to the §112 Rejections of Claims 1, 12, 18-19, and 21

In response to the §112 rejection of claims 1, 18-19, and 21 on page 2, paragraph (a) of the November 26, 2004 Office Action, Applicants have hereby amended claims 1, 18-19, and 21, by deleting the "<" symbols in such claims.

Applicants hereby traverse the §112 rejection of claim 12 on page 2, paragraph (b) of the November 26, 2004 Office Action. Specifically, since claim 12 is directly depending from claim 9, which recites an adsorbent bed material without any reference to metal hydrides, there is no double inclusion problem involved. Further, since neither claim 12 nor its base claim 9 provide any antecedent basis for metal hydrides, the Examiner's proposed amendment of claim 12 in paragraph (b) of the November 26, 2004 Office Action would result in recitation of the metal hydrides in such claim without proper antecedent basis. Therefore, Applicants respectfully request the Examiner to reconsider, and upon reconsideration to withdraw, the §112 rejection of claim 12.

In response to the §112 rejection of claim 1 on page 2, paragraph (c) of the November 26, 2004 Office Action, Applicants have hereby amended claim 1 by adding the phrase "thereby improving delivery reproducibility of the cyclosiloxane precursor" at the end of such claim.

In response to the §112 rejection of claims 18-19 on page 2, paragraph (d) of the November 26, 2004 Office Action, Applicants have hereby amended claim 1, which is the base claim for claims 18-19, by deleting the term "optionally" from claim 1. Therefore, claim 1 as amended provides antecedent basis for the phrase "the at least one impurity" in claims 18-19.

Response to the §103 Rejection of Claims 1-7, 9-19 and 21

In the November 26, 2004 Office Action, the Examiner rejected claims 1-7, 9-19 and 21 under 35 U.S.C. §103(a) as being unpatentable over McEntee U.S. Patent No. 4,127,598 (hereinafter "McEntee"), Tsukuno et al. U.S. Patent No. 5,312,947 (hereinafter "Tsukuno"), or Imai et al. U.S. Patent No. 4,774,346 (hereinafter "Imai").

In response, Applicants have hereby cancelled claim 2 and amended claim 1.

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Applicants respectfully traverse the Examiner's claim rejections, for the following reasons:

The amended claim 1, from which all the remaining claims 3-7, 9-19, and 21 depend, now recites:

"A process for improving delivery reproducibility of a cyclosiloxane precursor to a chemical vapor deposition reactor, comprising the steps of:

(a) providing a cyclosiloxane precursor;

(b) treating said cyclosiloxane precursor, by reducing the concentration of water and at least one impurity selected from the group consisting of acidic and basic impurities from said cyclosiloxane precursor to produce a purified cyclosiloxane precursor;

(c) vaporizing said purified cyclosiloxane precursor; and

(d) delivering vapor of said purified cyclosiloxane precursor to said chemical vapor deposition reactor,
wherein treatment of the cyclosiloxane precursor functions to prevent or minimize premature polymerization of said cyclosiloxane precursor in the chemical vapor deposition reactor and associated delivery lines, thereby improving delivery reproducibility of the cyclosiloxane precursor."

The McEntee reference only discloses removal of non-acidic and non-basic impurities, such as biphenyls, chlorinated biphenyls, vinyl chloride, carbon tetrachloride, and aromatic hydrocarbon impurities (see McEntee, column 4, lines 39-50), from impure silanes and siloxanes, which include cyclosiloxanes (see McEntee, column 5, lines 26-34).

In the November 26, 2004 Office Action, the Examiner asserted that the carbon tetrachloride impurity and the vinyl chloride impurity disclosed by McEntee "would fall within ... acidic impurities as claimed e.g. in claims 2-3" (see the Office Action, page 4, first paragraph).

Such assertion is incorrect.

Both carbon tetrachloride and vinyl chloride are non-acidic and non-basic compounds. An acidic or a basic compound is a compound that, when dissolved in water, gives or accepts protons (H^+ ions) or hydroxide ions (OH^-) (see the enclosed definitions of "Acid" and "Base" from WIKIPEDIA, THE FREE ENCYCLOPEDIA, as downloaded on February 28, 2005 from <http://en.wikipedia.org/wiki>). However, neither carbon tetrachloride nor vinyl chloride is soluble in water; nor do they give or accept protons or hydroxide ions. Therefore, they are NOT acidic or basic impurities, despite the Examiner's assertion.

Nothing in the McEntee reference teaches or suggests removal of acidic or basic impurities from cyclosiloxanes, as expressly required by claims 1, 3-7, 9-19, and 21 of the present application.

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The Tsukuno reference only suggests removal of ionic crystals, which are either organic or inorganic salts that are non-acidic and non-basic, and water, which is also non-acidic and non-basic, from a siloxanes crude product (see Tsukuno, column 2, lines 15-17 and 51-54).

Nothing in the Tsukuno reference teaches or suggests removal of acidic or basic impurities from cyclosiloxanes, as expressly required by claims 1, 3-7, 9-19, and 21 of the present application.

The Imai reference relates only to purification of hexamethyldisiloxane, which is NOT a cyclosiloxane (see Imai, column 2, lines 21-28). Further, Imai does not in any manner teach or suggest removal of acidic or basic impurities from the impure hexamethyldisiloxane; instead, it teaches addition of an acidic or basic compound into the impure hexamethyldisiloxane (see Imai, column 1, lines 54-55).

Therefore, the Imai reference does not provide any derivative basis for removal of acidic or basic impurities from cyclosiloxanes, as expressly required by claims 1, 3-7, 9-19, and 21 of the present application.

As mentioned previously, an important and unobvious aspect of the Applicants' invention resides in the discovery or recognition of the source of the cyclosiloxane premature polymerization problem occurred during CVD process, i.e., the presence of trace amount of water, basic and/or acidic impurities in the cyclosiloxane precursors, causing the catalytic polymerization thereof.

Therefore, the inquiry of obviousness in this case must be directed to the question of whether or not such a recognition would have been obvious to one of ordinary skill in the art prior to Applicants' invention, without the benefit of hindsight of Applicants' own disclosure in the instant specification, consistent with the court's holdings in *In re Roberts and Burch*, 176 USPQ 313, 314 (CCPA 1973) and *In re Spinnoble*, 160 USPQ 237, 243 (CCPA 1969).

None of the references cited by the Examiner even contemplates the premature polymerization problem associated with chemical vapor deposition of cyclosiloxane precursors, much less than recognizing presence of water, basic and/or acidic impurities therein as the source of such premature polymerization problem.

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Therefore, Applicants' claimed invention as recited in amended claims 1, 3-7, 9-19, and 21 of the present application patentably distinguishes over all the cited references, by recognizing the presence of water, basic and/or acidic impurities in the cyclosiloxane precursors as the source of the cyclosiloxane premature polymerization problem occurred during CVD process and by correspondingly providing a solution (i.e., water and acidic/basic impurity removal) for preventing or minimizing premature polymerization based on such recognition.

CONCLUSION

Based on the foregoing, pending claims 1, 3-7, 9-19, and 21 as amended/cancelled herein are in form and condition for allowance. The Examiner therefore is respectfully requested to issue a Notice of Allowance.

The Office is hereby authorized to charge any additional fees determined to be properly payable for entry of this Response, to Deposit Account 50-0860 of Advanced Technology Materials, Inc.

If any issues remain outstanding, incident to the formal allowance of the application, the Examiner is requested to contact the undersigned attorney at (919) 419-9350 to discuss same, in order that this application may be allowed and passed to issue at an early date.

Respectfully submitted,



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